Department of Marketing

WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Research Seminars Series

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October 20th, 2022 | 13:00 - 15:00 | AD.0.114 - Sitzungssaal 1

BEAT Unintended Bias in Personalized Policies

Abstract: An inherent risk of algorithmic personalization is disproportionate targeting of individuals from certain groups (or demographic characteristics such as gender or race), even when the decision maker does not intend to discriminate based on those "protected" attributes. This unintended discrimination is often caused by underlying correlations in the data between protected attributes and other observed characteristics used by the algorithm (or machine learning (ML) tool) to create predictions and target individuals optimally. Because these correlations are hidden in high dimensional data, removing protected attributes from the database does not solve the discrimination problem; instead, removing those attributes often exacerbates the problem by making it undetectable and, in some cases, even increases the bias generated by the algorithm.

We propose BEAT (Bias-Eliminating Adapted Trees) to address these issues. This approach allows decision makers to target individuals based on differences in their predicted behavior—hence capturing value from personalization—while ensuring a balanced allocation of resources across individuals, guaranteeing both group and individual fairness. Essentially, the method only extracts heterogeneity in the data that is unrelated to protected attributes. To do so, we build on the General Random Forest (GRF) framework (S. Athey et al., Ann. Stat. 47, 1148–1178 (2019)) and develop a targeting allocation that is "balanced" with respect to protected attributes. We validate BEAT using simulations and an online experiment with N=3,146 participants. This approach can be applied to any type of allocation decision that is based on prediction algorithms, such as medical treatments, hiring decisions, product recommendations, or dynamic pricing.